

[600.1263; A3883; HEM 02/805]

DEVICE AND METHOD FOR IDENTIFYING MODULES IN A GRAPHICS MACHINE

[0001] This claims priority to U.S. Provisional Patent Application No. 60/453,356, filed March 10, 2003 and hereby incorporated by reference herein.

BACKGROUND INFORMATION

[0002] The present invention relates to a device and method for identifying modules used in graphics industry machines, such as folders, gatherers, printing presses and stitchers.

[0003] U.S. Patent No. 6,166,653 discloses a system for address initialization of generic nodes in a distributed command and control system for a transportation system and a related method. A distance is determined from the control unit to each node and a specific address is assigned to the node based on the relative location of the node.

BRIEF SUMMARY OF THE INVENTION

[0004] An object of the present invention is to permit the identification of different devices attached to a graphics machine. "Graphics machine" as defined herein includes any machine used in the graphical industry.

[0005] The present invention provides a method for detecting a type of one of plurality of devices attached to a graphics machine, each device being one of at least a first type and a second type, the method comprising: detecting at a controller the type of device attached, to or to be attached, to the machine. The controller can pre-adjust the device or controller as a function of the detection.

[0006] Preferably, the device includes a type identifier, and an identifier reader can be connected to the controller.

[0007] Preferably, the controller sends a control signal to the device as a function of the detection.

[0008] Preferably, the devices can be added or removed and replaced with other devices, i.e. the devices are modules. These modules may be for example hoppers (feeders) for a binding line, such as a saddle back or flatback binding line. These feeders may be for example of different types: horizontal feeders, vertical feeders, cover folder feeders, card feeders, CD inserters, gluepots, numbering units, or print pockets. Other examples of graphics machines are a printing press, a stacker, a trimmer, or a folder. For example, for a printing press a cloth-type blanket washer or brush-type blanket washer could be identified, and thus the controller could identify the type of blanket washer and control that washer accordingly. A type of ink fountain feeder could be identified as well, for example an anilox inker. For a folder, different types of cutoff controls or silicon applicators could be identified.

[0009] The machine preferably may run a self-test check upon each turn-on of the machine to determine which devices are connected to the machine.

[0010] The present invention also provides a graphics machine comprising: a controller; a first device connected to the controller, the first device being categorizable as one of at least a first type and a second type, the controller detecting the type of the first device; and a memory accessible by the controller, the memory storing information regarding the first type and the second type.

[0011] Preferably, the first device includes a type identifier, and the machine further comprises an identifier reader connected to the controller.

[0012] The controller preferably is capable of automatically adjusting the first device as a function of the information.

[0013] Preferably, the information is stored as a table.

[0014] The first device may be connected to the controller via an electrical plug, a fixed transmission line or a wireless connection.

[0015] Preferably, the graphics machine includes a second device connected to the controller, the second device being one of the first type and the second type.

[0016] The first device preferably is modular, i.e. the first device is removably connected to the controller and replaceable by another device which is one of the first type and the second type.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The present invention is described with reference to the following figures, in which:

[0018] Fig. 1 shows a saddle-back bindery having various modules detected by a controller according to the present invention;

[0019] Fig. 2 shows a plug connection for permitting identification of the device type;

[0020] Fig. 3 shows an end view of the plug connection of Fig. 2;

[0021] Fig. 4 shows an alternate plug connection;

[0022] Fig. 5 shows yet another alternate plug connection;

[0023] Fig. 6 shows an alternate embodiment with the device having a voltage source; and

[0024] Fig. 7 shows a digital signal generated in another embodiment of the present invention.

DETAILED DESCRIPTION

[0025] Fig. 1 shows a saddle back conveyor line 10 for collecting printed products, which are then stitched by a stitching device 20. At predefined locations or stations along the conveyor line 10 are feeder modules, which as shown are a vertical feeder 12, a

horizontal feeder 14, a card inserter 16 and another vertical feeder 18. These feeder modules feed their respective products to the conveyor line 10 to form a collected printed product 30 which is then stitched by saddle back stitching device 20 to form a finished product 32. While the line has been described with four stations, many more stations may be provided and other types of modules may be included, such as glue pots, numbering units, CD inserters, cover folder feeders, print pockets, blown-in card feeders; hopper loaders, onset feeders, and stackers and trimmers, which would come after the stitching device.

[0026] These modules are interchangeable along the line, so that for example card inserter 16 and horizontal feeder 14 might need to be switched for a new printed product configuration.

[0027] Each module 12, 14, 16, 18 contains a type identifier 41, 42, 43, 44, respectively to identify the type of module. An identifier reader 51, 52, 53, 54 can determine, in conjunction for example with a processor 60 and a memory 61, the type provided by identifier 41, 42, 43, 44, respectively. Each reader 51, 52, 53, 54 is connected by an input 71, 72, 73, 74, respectively, to the processor 60, for example by a data bus.

[0028] As shown in Fig. 2, type identifier 41 may be a plug with a configuration unique to the type of device, for example a vertical feeder or hopper 12. As shown in Fig. 3, plug 41 may have four pins, 140, 141, 142, 143, with pin 140 providing power from reader 51. Reader 51 provides power to pin 140 at a certain voltage and reads the voltage at each of the other pins 141, 142, 143. Connection from pin 140 to pins 141, 142 and/or 143 in identifier 41 is provided via a connection 144 during a manufacturing of the type identifier 41.

[0029] If reader 51 registers a voltage solely at pin 141, the reader 51, which has a D-A converter can send a three-bit digital signal 001 to the processor 60. A table stored in memory 61 can identify 001 as a vertical feeder. The processor 60 then automatically

may undertake control steps, for example altering characteristics of a graphical user interface or altering other devices on line 10, or of stitching device 20 as a function of the type of device at the first location on the line 10.

[0030] With the four pin configuration of identifier 41, eight different types may be identified. No power read at pins 141, 142 and 143 could identify a horizontal feeder and lead to a 000 output byte, power at pin 141 only a vertical feeder with a 001 output, at pin 142 only a card inserter and a 010 output, at pin 143 only a CD inserter and a 011 output, power at pins 141 and 142 only print pocket inserter and a 100 output, power at pins 141, and 143 only a numbering unit and a 101 output, power at pins 142 and 143 only a gluepot and a 110 output and power at all three pins a blown in card feeder and a 111 output.

[0031] Thus memory 61 can contain a database such as a table, with 000 identifying a horizontal feeder, 001 a vertical feeder and so on. Processor 60, which receives the bytes from the readers 51, 52, 53, 54 at known inputs 71, 72, 73, 74 thus knows exactly which type of device is at which location on the line 10.

[0032] Alternately, the reader could provide direct inputs from the pins 141, 142, 143 to the processor 60, with an A-D converter for each pin merely providing a zero or one depending on power at the pin and the processor 60 processing the data from each pin 141, 143, 143 directly. In other words, part of the reader 51 functions may be accomplished by the processor 60 and the processor 60 can sense the presence or absence of power on each pin 141, 142, 143.

[0033] It should be noted that additional pins or fewer pins may be used, and the pins may be used for other functions as long as the use does not interfere with the identification process.

[0034] Fig. 4 shows an alternate type identifier 151 where a pin 151 may be used to provide a control signal or power the module via a cable 156. A reader 153 provides a

certain voltage or current at a pin 153, with current flowing through a resistor 155. A voltage or current then is read at a pin 154 by the reader, this read voltage or current being a function of the resistance of the resistor. The reader or processor can convert this read voltage or current through an A-D converter into a unique digital signal, which via information stored in memory 61. Thus for example a plug with a 1000 ohm resistor can identify one type of device, and a plug with a 10K resistor another type of device. A large number of types thus can be identified using different resistance resistors depending on the sensitivity and accuracy of the A-D converter.

[0035] Fig. 5 shows the same type identifier as in Fig. 4, without the extra pin 152. In this embodiment, the type identifier need not be connected electrically to the module, and may simple be attached by a chain 157, for example.

[0036] However, pin 152 may be advantageous for example to send a control signal back to the module, for example to preadjust the module depending on the type of module connected on line 10.

[0037] Controller 60 also can perform a self test at each start up of the line 10 to identify the components on line 10.

[0038] Fig. 6 shows an alternate embodiment in which the module 12 has a voltage source 112 connected to a type identifier 141. The voltage source 112 provides a unique voltage depending on the type of module 12 to a pin at identifier 241. The voltage which is read by reader 251 and sent to processor 60. For example 5 volts could indicate a vertical hopper, while 10 volts indicates a horizontal hopper, and this information is stored in memory 61. The number of types of modules which then can be uniquely identified is a function of the range of voltage and sensitivity of an A-D converter.

[0039] Fig. 7 shows yet another alternate embodiment in which the type identifier provides a unique digital signal, provided via a plug with a pin for the signal and one for ground and one for power, if the module does not provide power. The signal may be sent

to each digital input of the processor 60. For example, the signal may be provided continuously to the processor 60, so that presence of the module on line 10 is always recognized, and also accidental removal of the module 10 can also be recognized.

[0040] Fig. 7 shows an example of a 2 second signal sent by a chip provided at the module 12. A start bit is provided for the first continuous 400 milliseconds to identify the start of the signal, and then 8 data bits are sent, thus providing for an eight byte word capable of identifying 255 unique types of modules. The bits are of 100 millisecond duration followed by a 100 millisecond space. The signal may be a 24dc volt signal, with 24 volts indicating an on and zero or less than a certain voltage below 24 volts indicating volts an off.

[0041] Additional bytes could be provided to identify the location of the module on the line, if each location did not provide a unique input to the controller or processor 60, and thus a multiplexed signal could be provided to a single input at processor 60.

[0042] The value of the byte would be used via a table in memory 61 to identify the type of module.

[0043] It should be noted that based on the type, the value of pile overload switches, sensors, or inhibit selective modes may be identified or controlled by controller 60, and all of this information may be stored in memory 61.

[0044] The type identifier alternately may include a timer chip which would supply a digital signal of unique time duration based on the type of module. The timer ship thus has a clock pulse combined with a counting circuit. The duration of the digital signal may then be identified by processor 60 to determine the type of device. For example, a duration of 200 milliseconds could identify a vertical hopper and a duration of 400 milliseconds a horizontal hopper.

[0045] The type identifier alternately may be a tag read by an inductive field as the module is mounted on the machine. Such a device is manufactured for example by Pepperl and Fuchs (www.pepperl-fuchs.com) and consists of a read-write head and tags. The tags are powered up as they pass the read-write head of the reader and send back up to 1k bytes of data. The tags also can be written to by the read-write head to provide the type identification.

[0046] The present invention thus allows proper machine control of the modules, and proper motion control. The method of the present invention permits the controller to deterministically identify the presence and type of a particular module. Controller 60 may be an Intel-based processor for example or a PLC.